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TITLE: Subtyping of Toddlers with ASD Based on Patterns of Social Attention Deficits

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

The main objective of the proposed project is to elucidate the factors that affect spontaneous dyadic orienting at the earliest stages when ASD can be reliably diagnosed in order to advance our understanding of phenotypic heterogeneity and foster identification of more homogeneous and clinically relevant subgroups within the autism spectrum. Initial major tasks of the research project included regulatory review and approval and preparation of the eye tracking experiment, both completed in Q1Y1. Subject recruitment and enrollment is ongoing. There have not been any other administrative, technical, or logistical issues that impact performance or progress of the study. As of Q4Y1, we have recruited 70 subjects and have enrolled 50 subjects. 20 subjects have ASD, 10 have DD, and 20 are TD. As we have met the annual enrollment milestone for the TD group, in the upcoming period we will focus our efforts more heavily on recruiting into the ASD and DD groups. All enrolled subjects have complete Time 1 subject assessment and data acquisition. Thus far there have been no dropouts or disqualifications. We have made solid progress in implementing the tasks outlined in the SOW. In the upcoming quarter we will begin preliminary analyses of our eye tracking data.

15. SUBJECT TERMS ASD, subgrouping, toddlers, heterogeneity, eye-tracking, visual attention, dyadic orienting, hierarchical clustering, predictors of outcome					
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1. INTRODUCTION:

Toddlers with ASD vary tremendously in the type and severity of symptoms they experience. Moreover, while some toddlers with ASD greatly improve in terms of their social difficulties, cognitive abilities, and language skills, for a large proportion of affected children the outcome is poor and characterized by limited gains over time. At present, we neither understand the sources of this diversity, nor can we predict outcome reliably in affected toddlers, which limits our ability to design better screening and diagnostic instruments, to develop more effective treatments for young children, as to identify the causes of the disorder. To improve this situation, we need to discover how to better classify and categorize patterns of behavior and development within the autism spectrum. Our subgrouping analysis based on visual responses to dyadic orienting tasks will be performed on 18-24 month old toddlers, at the age when the first diagnosis is made and determination of risk for poor or positive outcome is essential for treatment planning. Therefore, this work has great potential to help us understand the mechanisms underlying these social attention deficits and predictors of outcome, as well as guide the development of individualized treatments that will accommodate the specific profiles of strengths and weakness in the identified subgroups. The design of our study will permit greater understanding of the sources of variability that complicate early detection efforts and will further generate hypotheses regarding the underlying neural substrates affected at the earliest stages of ASD. The impact of this study will be fourfold: (1) identification of phenotypically homogenous groups within ASD; (2) identification of more accurate predictors of outcome; (3) facilitation of development of individualized early interventions; and (4) informing our understanding of the mechanisms underlying the emergence of social deficits.

2. KEYWORDS:

ASD, subgrouping, toddlers, heterogeneity, eye-tracking, visual attention, dyadic orienting, hierarchical clustering, predictors of outcome

3. OVERALL PROJECT SUMMARY:

Summary of Current Objectives:

The main objective of the proposed project is to elucidate the factors that affect spontaneous dyadic orienting at the earliest stages when ASD can be reliably diagnosed in order to advance our understanding of phenotypic heterogeneity and foster identification of more homogeneous and clinically relevant subgroups within the autism spectrum.

Summary of Results, Progress, and Accomplishments with Discussion:

Initial major tasks of the research project included regulatory review and approval (SOW 1.2.1), which was achieved in Q1Y1, and preparation of the eye tracking experiment (SOW 1.2.2), also completed in Q1Y1. Subject recruitment and enrollment, while ongoing, is lagging somewhat behind projections due to a longer than expected preparatory stage. There have not been any other administrative, technical, or logistical issues that impact performance or progress of the study. As of Q4Y1, we have recruited 70 subjects and have enrolled 50 subjects. 20 subjects have ASD, 10 have DD, and 20 are TD. As we have met the annual enrollment milestone for the TD group, in the upcoming period we will focus our efforts more heavily on recruiting into the ASD and DD groups. All enrolled subjects have complete Time 1 (T1) subject assessment and data acquisition. T1 subject assessment includes eye tracking, Mullen Scales of Early Learning (developmental assessment), medical/family/intervention history, Vineland II (adaptive skills assessment), ADOS (diagnostic assessment), and feedback with families. Data acquisition (SOW 1.2.6) involves processing eye tracking data using custom software written in Matlab, and double-entering characterization data into the database and checking for errors using automated programs and manual checking procedures, and has been ongoing. Thus far there have been no dropouts or disqualifications.

We have made solid progress in implementing the tasks outlined in the SOW and are continuing to recruit and enroll subjects, particularly those with ASD and DD, to meet milestones. In the upcoming quarter we will begin preliminary analyses of our eye tracking data.

4. KEY RESEARCH ACCOMPLISHMENTS:

Nothing to report.

5. CONCLUSION:

Lack of insight into the bases of heterogeneity in ASD constitutes a major barrier to understanding the etiology of autism and designing highly effective targeted treatments for children with a wide range of abilities. Understanding the underlying factors contributing to atypical responses to dyadic bids may both illuminate the mechanisms underlying social orienting deficits in ASD as well as help to decode the behavioral variability of later emerging, scaffolded, and higher-level skills. Through this project we will investigate factors that affect dyadic orienting in ASD as compared to non-ASD groups, identify subgroups of toddlers within ASD based on their gaze patterns in response to dyadic bids and evaluate validity of the identified subtypes, employ novel statistical approaches to identifying the most accurate predictors of outcome amongst toddlers with ASD and further refine our understanding of specific factors associated with atypical outcomes.

In the upcoming quarter (Q1 Y2), we will begin seeing children for their Time 2 visits as they turn 36-42 months of age. Statistical analyses of eye tracking and characterization data will be carried out beginning in Q1 Y2 for purposes of preliminary discussion and potential dissemination.

6. PUBLICATIONS, ABSTRACTS, AND PRESENTATIONS:

Nothing to report.

7. INVENTIONS, PATENTS AND LICENSES:

Nothing to report.

8. REPORTABLE OUTCOMES:

Nothing to report.

9. OTHER ACHIEVEMENTS:

Nothing to report.

10. REFERENCES:

None

11. APPENDICES:

None